

## 16 Demersal elasmobranchs - Iceland and East Greenland

### 16.1 Ecoregion and stock boundaries

The elasmobranch fauna off Iceland and Greenland is little-studied and comprises 15 skate and 21 shark species (with six species of chimaeroid also present). The number of species decreases as water temperature decreases, and only a few of these species are common in Icelandic and Greenland waters.

An ecosystem overview for the ecoregion of Icelandic waters has been published and is available at the ICES website:

([http://ices.dk/sites/pub/Publication%20Reports/Advice/2017/2017/Ecosystem\\_overview-Icelandic\\_Waters\\_ecoregion.pdf](http://ices.dk/sites/pub/Publication%20Reports/Advice/2017/2017/Ecosystem_overview-Icelandic_Waters_ecoregion.pdf)).

The most abundant elasmobranch species in this ecoregion is starry ray (thorny skate) *Amblyraja radiata*.

In Icelandic waters, other skate species occurring are: Arctic skate *Amblyraja hyperborea*, Jensen's skate *Amblyraja jenseni*, common skate complex, Norwegian skate *Dipturus nidarosienis*, shagreen ray *Leucoraja fullonica*, roughskin skate *Malacoraja spinacidermis*, Krefft's skate, *Malacoraja krefftii*, deep-water ray *Rajella bathyphila*, Bigelow's skate *Rajella bigelowi*, round skate *Rajella fyllae*, sailray *Rajella lintea* (former *D. linteus*) and spinytail skate *Bathyraja spinicauda*.

In Greenland waters, the commonly found skates include *R. fyllae*, *B. spinicauda* and *A. hyperborea*, with species such as *R. bathyphila*, *M. spinacidermis*, *R. lintea*, *A. jenseni* and *R. bigelowi* being less frequent (Möller *et al.*, 2010).

Dogfish and sharks in this ecoregion include spurdog *Squalus acanthias* (Section 2); Portuguese dogfish *Centroscymnus coelolepis* and leafscale gulper shark *Centrophorus squamosus* (Section 3); birdbeak dogfish *Deania calcea*, black dogfish *Centroscyllium fabricii*, great lantern shark *Etmopterus princeps*, velvet belly lanternshark *E. spinax*, longnose velvet dogfish *Centroselachus crepidater* and six gill shark *Hexanchus griseus* (Section 5); porbeagle shark *Lamna nasus* (Section 6); basking shark *Cetorhinus maximus* (Section 7); Greenland shark *Somniosus microcephalus* (Section 24); and several scyliorhinid catsharks (Iceland catshark *Apristurus laurussonii*, white ghost catshark *A. aphyodes*, small-eye catshark *A. microps* and mouse catshark *Galeus murinus*).

Chimaeras (rabbittfish *Chimaera monstrosa*, spearnose chimaera *Rhinochimaera atlantica*, large-eyed rabbittfish *Hydrolagus mirabilis*, *H. pallidus*, small-eyed rabbittfish *Hydrolagus affinis*, narrownose chimaera *Harriotta raleighana*) all occur in the area.

Stock boundaries are not known for the species in this area. Neither are the potential movements of species between coastal and offshore areas. Further investigations are necessary to determine potential migrations or interactions of elasmobranch populations within this ecoregion and neighbouring areas.

## 16.2 The fishery

### 16.2.1 History of the fishery

Skates and sharks are mainly a bycatch in fisheries, with Iceland being the main fishing nation operating in the ecoregion. Common skate complex is fished with a variety of fishing gears (Figure 16.1a). They used to be regarded as fairly common in Icelandic waters, but landings may now only be about 10% of what was landed 50 years ago. A large part of the landed catch is for local consumption, as the species within the common skate complex are traditional food in Iceland, particularly at Christmas time. The remaining catch is processed and mainly exported.

*A. radiata* is a bycatch in a variety of fishing gears around Iceland but was usually discarded. Increased landings since the 1990s may be related to an increased retention compensating for a lower abundance of the common skate complex. Landings are reported mainly from the longline fishery (Figure 16.1b). Reported landings have increased from low levels in 1980 to more than 1000 tonnes annually from 1995–2004. Thereafter, landings declined but have increased again to levels exceeding 1700 tonnes in 2012. From 2012 to 2016, landings have gradually reduced to approximately 1250 tonnes in 2016, followed by an abrupt decline in 2017, being ca. 600 tonnes in 2018. In 2019 and 2020, landings slightly increased again, but are not at the same level as observed before 2017. A relatively large proportion of the landings is for local consumption.

### 16.2.2 The fishery in 2020

No new information.

### 16.2.3 ICES advice applicable

ICES does not provide advice on these stocks.

### 16.2.4 Management applicable

There is no TAC for demersal skates in these areas.

## 16.3 Catch data

### 16.3.1 Landings

From 1973–2020, 13 countries reported landings of skates, demersal sharks and chimaeras from Divisions 5.a (Iceland) and 14.a and 14.b (East Greenland). Iceland is the main nation fishing in these areas.

Reported landings of skates from Iceland (Division 5.a) and eastern Greenland (Subarea 14) are given in Table 16.1, with these data comprising national landings data provided to WGEF, landings statistics from the Faroese national database ([www.hagstova.fo](http://www.hagstova.fo)), and data from the ICES database.

Icelandic national data for estimated landings of the common skate complex (1973–2020), *A. radiata* (1977–2020), *R. lintea* (2000–2020) are available. Database entries for all species with national landings for the years 2001–2020 are available.

Prior to 1992, all skates (except *A. radiata* and common skate complex) were reported as 'Raja rays nei'. Since 1992, when skates have been reported to the species level, *A. radiata* and *Dipturus*

*batis*-complex have accounted for about 98% of the annual skate landings. Only small quantities of *L. fullonica*, *R. lintea* and *B. spinicauda* have been reported. Fishers do not usually distinguish between *L. fullonica* and *R. lintea* in Icelandic waters, and so landings of *R. lintea* are likely to be underestimated and landings of *L. fullonica* overestimated (as landings of the latter species, which is relatively rare in Icelandic waters, includes some *R. lintea*). Landings reported as *D. batis*-complex could also sometimes be *R. lintea*. Therefore, official landings on *L. fullonica* will be reported as *Raja* rays *nei* until this issue is locally resolved.

Reported skate landings peaked at 2500 t in 1951. Since then, the landings of the *D. batis*-complex have decreased but landings of *A. radiata* have increased in later years. Landings of *A. radiata* were under 1000 t but after 2005 increased to about 1800 t in 2012 contributing the bulk of landings of elasmobranchs in this ecoregion (Table 16.1; figures 16.2–16.3). Overall, over 95% of the skate landings came from Division 5.a. The share taken by Iceland from this area increased from <50% in the 1970s to nearly 100% from 1999 onwards.

Information on elasmobranch bycatch in East Greenland waters is unavailable, but several species are probably taken and discarded in fisheries for cod, shrimp and Greenland halibut *Reinhardtius hippoglossoides*.

### 16.3.2 Discards

No discard data were available.

### 16.3.3 Quality of catch data

The main skates landing nations in this ecoregion now provide species-specific information, but species identification needs improvement.

### 16.3.4 Discard survival

No data available to WGEF for the fisheries in this ecoregion.

## 16.4 Commercial catch composition

No data on the length distribution or sex ratio in commercial landings were available.

## 16.5 Commercial catch and effort data

No data available.

## 16.6 Fishery-independent surveys

### 16.6.1 Surveys in Greenland waters

Since 1998, the Greenland surveys (GR-GHXIVB) have covered the area between 61°45'–67°N at depths of 400–1500 m, although the area between 63–64°N was not covered by the surveys, as the bottom topography was too steep and rough. The surveys are aimed at Greenland halibut, although all fish species are recorded. The surveys use an ALFREDO III trawl (wingspread ≈ 21 m; headline height ≈ 5.8 m; mesh size (cod end) = 30 mm) with rock-hopper ground gear. These data were presented to WGEF in a working paper by Jørgensen (2006) and are summarized

in Table 16.2. Another source of survey data in Greenland waters is the German Greenland groundfish survey (GER (GRL)-GFS-Q4), and these data need to be examined.

### 16.6.2 Surveys in Icelandic waters

The Icelandic autumn groundfish survey (IS-SMH) is the main source of fishery-independent data for demersal elasmobranchs in Icelandic waters (Jakobsdóttir *et al.*, 2020). Further, data can be compiled for some species from other surveys e.g. spring groundfish survey (IS-SMB), shrimp and flatfish surveys undertaken by MFRI.

The IS-SMH survey covers the Icelandic shelf and slope at depths of 20–1500 m. It is a stratified systematic survey with standardized fishing methods. Small-meshed bottom trawls (40 mm in the cod-end) with a rock-hopper ground gear are towed at a speed of 3.8 knots for a predetermined distance of 3 nautical miles (See Björnsson *et al.*, 2007 for a detailed description of methodology).

Catch data and frequency of occurrence for skates from IS-SMH is summarised in Table 16.3. Catch data (number of individuals per survey) of all demersal elasmobranchs, for the years 1996–2020, can be found in Jakobsdóttir *et al.* (2020).

## 16.7 Life-history information

Published information on life history of skates and rays in Icelandic waters is scarce.

*Amblyraja radiata* is by far the most abundant elasmobranch species in Icelandic waters, with a widespread distribution over the Icelandic shelf and upper slope (Figure 16.4). Seasonal differences in distributional patterns have been noted, with *A. radiata* much less abundant on the shelf during autumn surveys (IS-SMH) than in spring survey (IS-SMB), and the bulk of catches in IS-SMH is taken on shelf break/slope north and east of Iceland (Figure 16.4 a and b, see also MFRI Technical reports, 2021).

Anecdotal information suggests that *A. radiata* undertakes seasonal migrations in relation to egg-laying activity, but this is unconfirmed. Trawl survey data may provide useful information on catches of viable skate egg cases and/or on nursery grounds.

Length–frequency distributions of *A. radiata* in IS-SMH (Figure 16.5) indicate the majority of specimens are <60 cm L<sub>T</sub>. Data on maturity derive from autumn survey allowing for calculations of maturity ogives. Length-at-50%-maturity (L<sub>50</sub>) is 42.9 cm and 41.0 cm (MFRI, Technical reports, 2021) L<sub>T</sub> for males and females respectively (L<sub>95</sub> for males is 51.1 cm and 50 cm for females). These values are lower in comparison to adjacent waters to the NW Atlantic stock (Templeman, 1987), but larger than observed in the North Sea, where L<sub>50</sub> is 36.2 and 38.4 cm L<sub>T</sub> for males and females, respectively (McCully *et al.*, 2012).

## 16.8 Exploratory assessment models

Abundance indices and biomass estimates for *A. radiata* have been calculated based on IS-SMB and IS-SMH, with a decreasing trend in large skates (>50 cm) observed (Björnsson *et al.*, 2007). Preliminary survey results indicate stable trends in major size groups in recent years after a period of decline (MFRI, Technical reports, 2021).

## 16.9 Stock assessment

No assessments have been undertaken for the skates in this ecoregion.

## 16.10 Quality of assessments

Exploratory analyses of survey trends have been conducted for *A. radiata*. However, the majority of commercial landings data are being taken by gears other than bottom trawl (Figure 16.1) and this should be considered.

## 16.11 Reference points

No reference points have been proposed for any of these species.

## 16.12 Conservation considerations

The common skate complex has been found to be vulnerable to exploitation and has been near-extirpated from coastal areas elsewhere in their range (e.g. parts of the Irish and North Seas). Preliminary investigation of the common skate complex in Icelandic waters indicated that the dominant species currently found in Icelandic waters is the smaller *D. batis*. Further investigation into the common skate complex and other large-bodied skates in Iceland and East Greenland is required.

## 16.13 Management considerations

The elasmobranch fauna off Iceland and Greenland is little studied and comprises relatively few species (21 sharks, 15 skates and six chimaeras). Most of the landings of skates are now reported to species.

The most abundant demersal elasmobranch in the area is *A. radiata*, which is widespread and abundant in this and adjacent waters. Negative survey trends for large size starry rays have been observed (Björnsson *et al.*, 2007). Preliminary results of more recent data indicate that after a period of decline, stock trends have been stable for a few years.

## 16.14 References

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ICES. 2016b. Official Nominal Catches 2006-2014. Version 22-06-2018. Accessed 22-06-2018 via <http://ices.dk/marine-data/dataset-collections/Pages/Fish-catch-and-stock-assessment.aspx> ICES, Copenhagen.

**Table 16.1. Demersal elasmobranchs - Iceland and East Greenland. Reported landings of skates from Iceland (Division 5.a) and East Greenland (Subarea 14). Data were updated with landings from ICES historic nominal landings database (ICES, 2016) and national landings data provided to the WG (June 2021). Faroese landings 1990–2015 were extracted from Faroes national statistics database available on [www.hagstova.fo](http://www.hagstova.fo) \*1990–2015: Total catch (live weight). \*\* Prior to 1992 all skates nei are assumed to belong to common skate complex (see earlier reports).**

Scientific name	Nation	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986
common skate complex	Iceland	364	275	188	333	442	424	403	196	229	245	185	178	120	108
<i>Amblyraja radiata</i>	Iceland	0	0	0	0	0	0	0	0	0	9	12	46	15	44
<i>Raja rays nei**</i>	Belgium	59	51	62	36	41	23	27	36	28	11	15	15	19	18
	Faeroe Islands	80	56	43	35	75	27	37	21	25	23	73	24	21	0
	Germany	76	41	49	41	37	10	2	1	2	2	4	3	2	1
	Norway	1	0	63	4	2	3	2	3	6	1	10	3	5	0
	UK - England & Wales	385	187	195	106	5	0	0	0	0	0	0	0	0	0
	UK - Scotland	5	8	14	8	0	0	0	0	0	0	0	0	0	0
Total		970	618	614	563	602	487	471	257	290	291	299	269	182	171

		1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
common skate complex	Iceland	130	152	152	222	304	363	274	299	245	181	118	108	80	94
	Norway	0	0	0	0	0	0	0	0	0	0	0	0	0	3
<i>Amblyraja radiata</i>	Iceland	125	39	100	163	286	317	294	1206	1749	1493	1430	1252	996	1076
<i>Leucoraja fullonica</i>	Iceland	0	0	0	0	0	0	2	12	24	19	16	12	21	27
<i>Raja rays nei**</i>	Belgium	22	20	22	6	9	6	3	0	0	0	0	0	0	0
	Faeroe Islands*	8	2	2	16	5	2	3	3	9	2	2	7	5	0
	Germany	0	0	0	1	3	1	2	0	9	0	0	1	0	7
	Norway	0	0	0	0	0	25	8	8	7	10	2	19	8	3
	Portugal	0	0	0	0	0	0	0	0	0	0	1	0	0	0
	UK - Eng+Wales+N.Irl.	0	0	0	0	0	1	2		4	0	0	1	2	0
Total		285	213	276	408	607	715	588	1529	2047	1705	1569	1400	1112	1210

**Table 16.1. (continued). Demersal elasmobranchs - Iceland and East Greenland. Reported landings of skates from Iceland (Division 5.a) and East Greenland (Subarea 14). Data were updated with landings from ICES historic nominal landings database (ICES, 2016a) and national landings data provided to the WG. \*Faroese landings 1990–2017 were extracted from Faroes national statistics database available on [www.hagstova.fo](http://www.hagstova.fo). Total catch (live weight). \*\* Official reports on *L. fullonica* are likely misidentification and thus, from 2005, these numbers are reported to WG as rays nei.**

Scientific name	Nation	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
common skate complex	Iceland	82	59	120	145	166	136	123	126	128	117	125	145	153	141	165	143	147	124	194	160
	Norway	0	0	0	0	0	0	0	0	0	0	0	0	0	0		0	0	0	0	0
<i>Amblyraja radiata</i>	Iceland	1211	1781	1491	1013	657	530	496	634	866	1026	1416	1978	1847	1625	1397	1273	652	604	963	804
<i>Rajella lintea</i>	Iceland	0	0	10	8	1	8	7	0	8	12	9	9	7	4	11	3	5	4	5	4
** <i>Leucoraja fullonica</i>	Iceland	37	32	17	23													0			
<i>Raja rays nei</i>	Faeroe Islands*	2	1	0	8	9	16	7	11	6	5	14	5	6	4	0	8	3	3		
	Germany	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0			
	France												0	0	0	0	0	0			
	Iceland	0	0	0	0	16	16	17	4	33	19	17	21	37	14	15	13	10	12	31	17
	Norway	6	5	1	0	0	7	0	1	2	4	4	0	0	0	1	1	0	0	4	
	Portugal	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
	Russian Federation	0	0	0	2	6	3	0	0	na	na	0	0	na	na	na	0	0	NA		
	Spain	0	0	15	0	0	0	0	0	0	0		0	0	0	0	0	0	0		
	UK	1	0	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0		
	<i>Raja clavata</i>								0	0	0	1	0	0	0	0	0	0	0		
	Total	1340	1878	1655	1200	855	726	650	786	1043	1183	1520	2039	1917	1788	1595	1433	817	761	1197	985

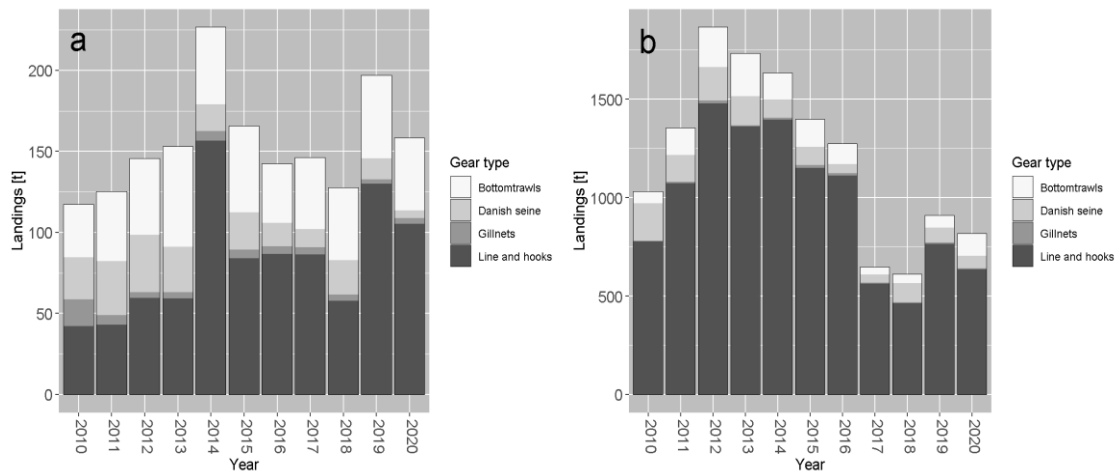


**Table 16.2. Demersal elasmobranchs - Iceland and East Greenland. Demersal elasmobranch species captured during groundfish surveys at East Greenland (1998–2005) giving the total number, observed maximum weight (kg), depth range (m) and bottom temperature range °C and most northern position (decimal degrees). Source: Jørgensen (2006).**

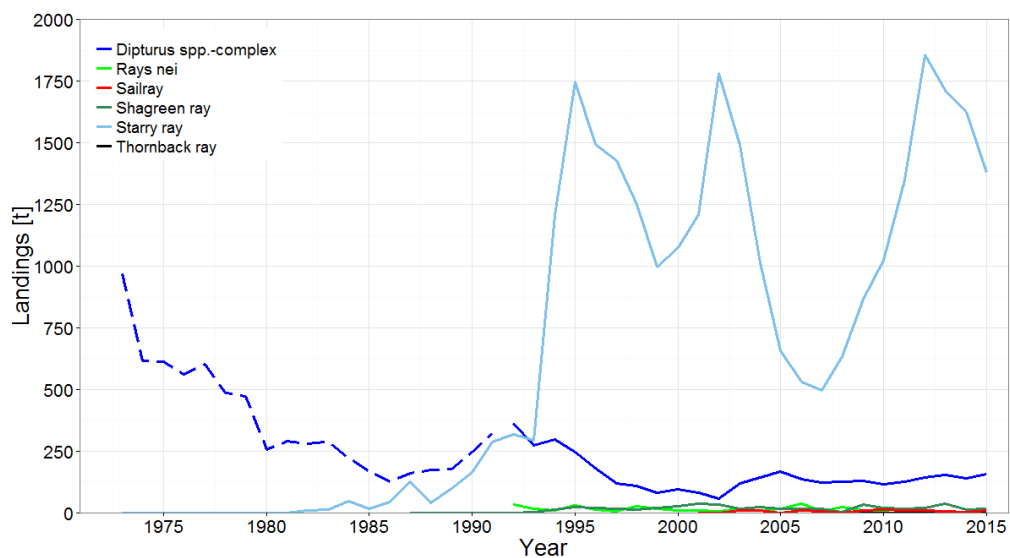
Species	N	Max wt (kg)	Depth range (m)	Temp range (°C)	Maximum latitude
<i>Bathyraja spinicauda</i>	82	61.5	548–1455	0.5–5.6	65.46°N
<i>Rajella bathyphila</i>	57	45.3	476–1493	0.3–4.1	65.44°N
<i>Rajella fyllae</i>	117	4.8	411–1449	0.8–5.9	65.46°N
<i>Amblyraja hyperborea</i>	12	23.4	520–1481	0.5–5.4	65.47°N
<i>Amblyraja radiata</i>	483	22.1	411–1281	0.8–6.6	66.21°N
<i>Malacoraja spinacidermis</i>	3	3.1	1282–1450	2.3–2.7	62.25°N
<i>Apristurus laurussoni</i>	3	0.7	836–1255	1.7–4.3	65.22°N
<i>Centroscyllium fabricii</i>	812	128	415–1492	0.6–5.1	65.40°N
<i>Somniosus microcephalus</i>	9	500	512–1112	1.4–4.9	65.35°N

**Table 16.3. Demersal elasmobranchs - Iceland and East Greenland. Catch data of skates and rays in MRI annual autumn groundfish survey at Iceland (Division 5.a), giving the number of individuals caught (N) and the frequency of occurrence (percentage of stations where species was collected, %O). 2011 survey (noted with asterisk) was discontinued and therefore data are incomplete.**

	2000		2001		2002		2003		2004		2005		2006		2007		2008		2009		2010	
	N	%O	N	%O	N	%O	N	%O	N	%O	N	%O	N	%O	N	%O	N	%O	N	%O	N	%O
common skate complex	6	<1	1	<1	3	<1	3	<1	1	<1	4	<1	6	1	7	1	7	1	9	1	4	<1
<i>Amblyraja radiata</i>	1589	48	1413	45	1442	49	1379	49	1957	51	1678	53	1716	52	1474	52	1569	48	1590	39	1399	46
<i>Rajella lintea</i>	2	<1	0	0	0	0	0	0	0	0	0	0	2	<1	0	0	0	0	0	0	0	0
<i>Amblyraja hyperborea</i>	110	9	160	9	80	8	88	8	97	9	104	8	120	10	59	10	90	9	103	9	86	10
<i>Rajella fyllae</i>	24	4	54	8	53	8	77	6	37	6	53	7	81	8	44	8	106	5	48	10	70	7
<i>Bathyraja spinicauda</i>	7	2	11	2	10	2	25	1	12	2	16	2	21	2	7	2	18	2	11	2	1	2
<i>Rajella bathyphila</i>	1	<1	0	0	0	0	1	<1	0	0	1	<1	0	0	0	0	2	<1	0	0	0	0
<i>Rajella bigelowi</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	<1	0	0	0	0
	2011*		2012		2013		2014		2015		2016		2017		2018		2019		2020			
	N	%O	N	%O	N	%O	N	%O	N	%O	N	%O	N	%O	N	%O	N	%O	N	%O		
common skate complex	1	1	0	<1	0	0	5	1	17	2	0	0	4	<1	10	1	4	1	4	<1		
<i>Amblyraja radiata</i>	295	42	918	34	1142	41	1289	52	1066	49	1268	48	1026	45	1218	42	159	43	919	48		
<i>Rajella lintea</i>	0	0	0	0	0	0	0	0	0	0	1		0	0	0	0	-	0	2	<1		
<i>Amblyraja hyperborea</i>	27	8	73	7	63	8	95	9	68	5	79	8	43	5	54	6	21	6	66	7		
<i>Rajella fyllae</i>	36	5	24	17	35	4	71	10	30	6	46	6	33	9	41	7	26	7	36	7		
<i>Bathyraja spinicauda</i>	2	0	11	1	4	2	11	2	5	1	4	1	5	1	7	1	0	0	2	1		
<i>Rajella bathyphila</i>	0	0	0	0	0	0	0	0	0	0	0	0	1	<1	0	0	0	0	0	0		
<i>Rajella bigelowi</i>	0	0	0	0	0	0	0	0	1	<1	0	0	1	<1	0	0	0	0	0	0		
<i>Malacoraja krefftii</i>									2	<1	3	<1	3	<1	0	0	1	<1	2	<1		



**Figure 16.1. Demersal elasmobranchs - Iceland and East Greenland. Icelandic landings of (a) common skate complex and (b) starry ray *A. radiata* by fishing gear). Note different scales at the y-axis.**



**Figure 16.2. Demersal elasmobranchs - Iceland and East Greenland. Landings of skates (Division 5.a and Subarea 14). Prior to 1992, all skates nei are assumed to belong to common skate complex (see earlier reports). WG estimates of the most commonly reported skates, 1973–2015. (ICES, 2016a), national landings data provided to the WG, and Faroese statistical database [www.hagstova.fo](http://www.hagstova.fo)).**

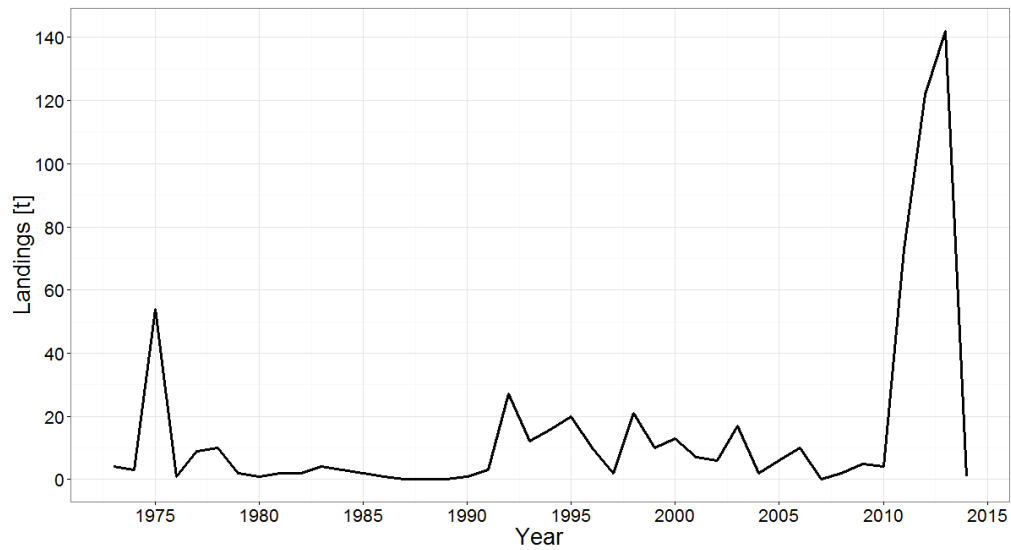


Figure 16.3. Demersal elasmobranchs - Iceland and East Greenland. Combined landings of rays and skates from East Greenland (Subarea 14). The peak landings in 2011–2013 originate from *Amblyraja radiata* (FAO Code RJR). Data from ICES (2016a, b).

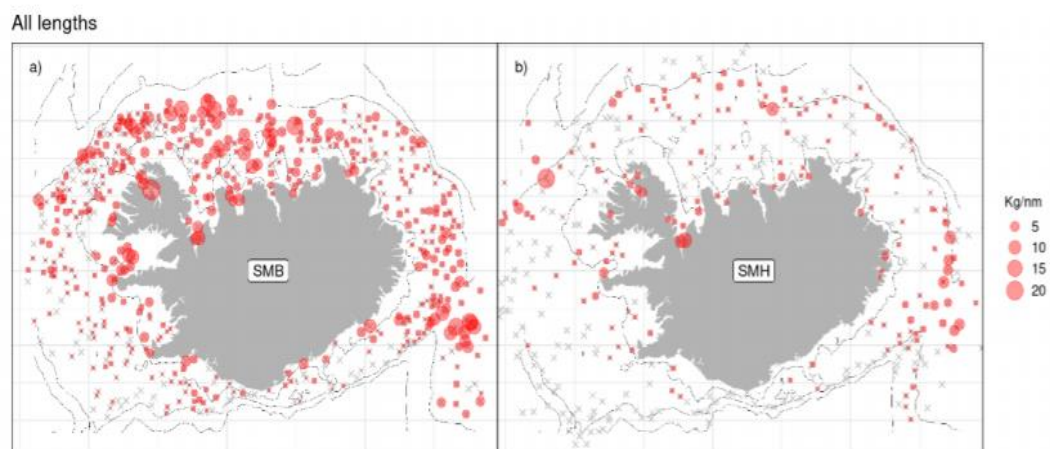


Figure 16.4. Demersal Elasmobranchs - Iceland and East Greenland. Spatial distribution of starry ray *A. radiata* in Icelandic waters (Division 5.a). a: Spring survey (IS-SMB) 2021. b: Autumn survey (IS-SMH) 2020. (see also *MFRI Technical reports 2021*)

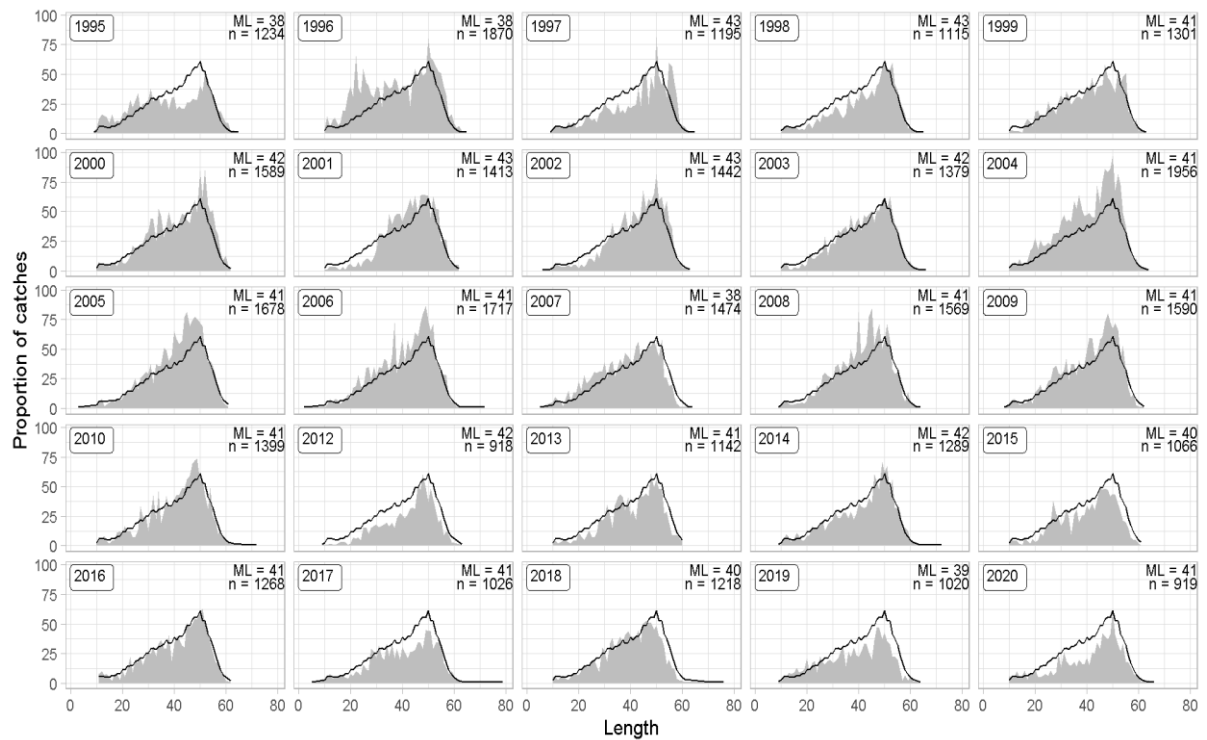


Figure 16.5. Demersal elasmobranchs - Iceland and East Greenland. Length distribution of starry ray *A. radiata* in Icelandic waters (Division 5.a) each year as observed in the annual autumn survey. Broken line denotes average value. Mean length each year is denoted in the upper right corner of each panel. (see also *MFRI Technical reports 2021*)